

Monthly, Seasonal Fluctuations and Breeding Season Studies of Cattle Egret, *Bubulcus ibis ibis* (L.) at Tahta District, Sohag Governorate

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ABSTRACT

The highest value of cattle egret birds were in fields nearby water canals during 2014/2015 and 2015/2016, while the lowest value was recorded in fields nearby buildings, field crops and trees. However, the highest value of abundance during March 2015 and April 2014, followed by March 2016 and April 2015, May 2014 and May 2015. While, the lowest value of population abundance of cattle egret were in June, July, August 2014 and August 2015 and January 2015 and 2016, February 2015 and 2016, September 2014 and 2015 and December 2014 and 2015. The highest value of cattle egret in Tahta district was in spring 2014 and 2015 and winter 2015 and 2016. While, the lowest value was recorded in autumn 2014 and 2015. The breeding period of cattle egret was reported to be from January to August, 2016. The egg laying pattern of the cattle egret revealed that the time interval between the two successive laying's was approximately 30-36 hours. Cattle egret lays five clutches which extend from 3 to 26 January to 5/August, 2016 breeding season, respectively. Clutch size was recorded to be 1 to 5 eggs, 3 being the commonest and exceptionally 1 during the study period with 60.00% of nests with three eggs, 15.00% with four, 10.00% with two and five eggs and remaining 5.00% with one egg. Minimum of incubation period of Cattle egret birds was (19 days). The maximum incubation period was 22 days during breeding season. Hatchability of egrets differed according to clutch; its value was 70.58% at the first clutch, 73.68% at the second clutch, 72.22% at the third clutch, 69.69% at the fourth clutch, respectively. The lowest percentage of hatching was recorded in fifth clutch (65.52%), during breeding season 2016.

Keywords: population, nearby, trees, breeding, period, clutch, egg, hatching, cattle egret, birds.

INTRODUCTION

Birds are important animal group that keep systems in balance; pollinate plants, disperse seeds, scavenge carcasses and recycle nutrients back into the earth. Cattle egrets are one of the common birds seen around human settlement, in rural as well as in urban set up and seem to be not much bothered by human activities. (Joshi and Shrivastava, 2012). The cattle egret, *Bubulcus ibis ibis* (L.) is thought to be one of the serious beneficial birds of agricultural areas in Egypt. The agricultural laws set to protect this bird species as possible as we can. It is understandable that this bird species is beneficial to cattle, as it walks among grazing cattle and sits on their backs in order to catch harmful insects and other small animals. It even follows ploughs running in land preparation to pick insect larvae and pupae, in addition to small animals particularly rats and slugs (Soliman, 1999). The present work was done in the farms of Tahta district at Sohag governorate in order to study of monthly, seasonal fluctuations and breeding season of Cattle egret, *Bubulcus ibis ibis* (L.).

MATERIALS AND METHODS

Study area:

The present work was conducted at Sohag governorate, which occupies the Upper Egypt, about 495 Km. South of Cairo. Sohag governorate boarded by Assiut in the North, in the South by Qena, in the East by Red Sea governorate, and in the West by New Valley governorate. Tahta district was located at the West of the Nile River.

Population fluctuation of cattle egret, *B. ibis ibis* (L.):

The research was carried out at Tahta district, Sohag governorate at four different habitats nearby (buildings, field crops, trees and water canals), during two successive years, from April, 2014 to March, 2016 (2014/2015 and 2015/2016). In these trails, area size is two feddans inside the chosen cultivated habitat, then number of cattle egret was counted in each habitat, by using the method of Redinger and Libay (1979) as a plot equivalent two feddans from the determined cultivated area in each habitat. The identification and counts of birds were achieved by using field glass (binoculars) from rising position, which gave clear sighted vision of the plots. This work has been accomplished twice daily, the first at sunrise and second at sun-set during One hour for four days

monthly. Bird classification was carried out by (Sibley and Monroe 1990) under review by the checklist committee of the American Ornithologists Union (A. O. U.) were followed in bird classification. The population fluctuations of cattle egret was studied monthly and seasonal daytime at four different habitats were mentioned above to find the relationship between population density of cattle egret and different seasons of year.

Biological study:

Biological aspects of Cattle egret, *B. ibis ibis* (L.):

Some biological aspects of the cattle egret (*B. ibis ibis*) were studied at Sohag governorate by chose 20 nests randomly during 2016 breeding season. These nests were investigated to record the available information about biological aspects such as; egg laying duration, clutch size, total number of eggs, and incubation period/day. At the same time percentage of hatchability were estimated for each clutch. The investigation nests were carried out daily during the breeding season from January to August (2016).

Egg laying proceeded after the nest was constructed by the paired partners and during this period. Nests were checked during the early morning, in order to reduce disturbance during incubation and avoid exposing of the eggs to excessive solar radiation. Nests were checked once every two days during the laying period and each egg was individually marked (Holcomb, 1974). Clutch size is the number of eggs laid in a single nest. Moreover, the time elapsed between the last egg laying and hatching of it was determined according to (Swanberg, 1959) to calculate the incubation period. On the other hand, the hatchability was defined as the ratio of the number of nestlings hatched to the number of eggs laid (Zduniak and Kuczynski 2003).

Statistical analysis:

Data obtained were statistically analyzed using a randomized complete block design. Means were compared according to Duncan's Multiple Range test, at 0.05 level of probability.

RESULTS AND DISCUSSION

Monthly of Population Fluctuation of Cattle egret, *B. ibis ibis* (L.):

Results in table (1) showed the effect of habitats types and daytime on the population density of Cattle egret, *B. ibis ibis* at Tahta district, Sohag governorate from 2014 to 2016.

The highest value of Cattle egret were in fields nearby water canals with means (8.83 and 5.08 individuals) during 2014/2015 and 2015/2016, with insignificant differences between them. The lowest value of Cattle egret were recorded in fields nearby buildings with means (0.83 and 1.79 individuals), field crops with means (1.63 and 1.46 individuals) and trees with means (1.17 and 1.67 individuals) during 2014/2015 and 2015/2016, respectively.

The monthly population abundance of Cattle egret birds in Tahta district during 2014/2015 and 2015/2016. Data in table (1) revealed that, the highest value of abundance during March 2015 and April 2014 with means (14.75 and 10.50 individuals), followed by March 2016 and April 2015 with mean (8.25 and 7.25 individuals), also, May 2014 and May 2015 with means (4.75 and 5.63 individuals). Moderate value of abundance was recorded in June and July 2015 with means (2.75 and 2.25 individuals). While, the lowest value of population abundance of Cattle egret were in June, July, August 2014 and August 2015 with means (1.88, 1.50, 1.13 and 1.13 individuals), January 2015 and 2016 with means (0.88 and 0.75 individuals), February 2015 and

2016 with means (1.13 and 1.00 individuals), September 2014 and 2015 (0.50 and 0.63 individuals) and December 2014 and 2015 (0.38 and 0.38 individuals). The results in the same Tables revealed that no individuals of cattle egret recorded in two months (October 2014/ 2015 and November 2014/ 2015, respectively). Generally, the yearly population trend of cattle egret indicated the presence of one major peak of abundance March and April. After wards, the population density trends to decrease gradually during May, June, July and August (table, 1). El – Danasory (2002) cleared that the highest population of Cattle egret was recorded from old land than new reclaimed land during 1998 than 1999 also revealed that the means of population was reached its maximum during Summer 1998 (37.55 bird) and Autumn 1998 (24.5 bird). Barakat -Noura (2016) cleared that, the highest values of Cattle egret at Tanta district were in field crops and water canals with average (35 and 37 individuals) in November 2012 and January 2013 at sun-rise and sun-set, while the lowest values were in buildings, field crops, trees and water canals with average (1 individual) at sun-rise and sun-set in, October, December 2012, 2013 and April 2014.

Table 1. Population fluctuation of Cattle egret, *Bubulcus ibis ibis* (L.) in Tahta district at Sohag governorate.

Month	2014/2015					2015/2016				
	Different habitats									
	B	F	T	W	Mean*	B	F	T	W	Mean*
Apr.	0.00	0.00	0.00	42.00	10.50ab	0.00	0.00	11.00	18.00	7.25abc
May	3.50	2.00	6.50	7.00	4.75bc	4.00	0.00	1.50	17.00	5.63 abc
Jun.	2.00	1.50	0.50	3.50	1.88bc	0.50	3.00	1.50	6.00	2.75bc
Jul.	0.00	0.00	0.00	6.00	1.50bc	9.00	0.00	0.00	0.00	2.25bc
Aug.	0.00	0.00	0.50	4.00	1.13bc	0.00	1.50	3.00	0.00	1.13bc
Sep.	0.00	0.00	0.00	2.00	0.50bc	0.50	0.00	0.00	2.00	0.63bc
Oct.	0.00	0.00	0.00	0.00	0.00c	0.00	0.00	0.00	0.00	0.00c
Nov.	0.00	0.00	0.00	0.00	0.00c	0.00	0.00	0.00	0.00	0.00c
Dec.	0.50	1.00	0.00	0.00	0.38bc	0.00	0.00	0.00	1.50	0.38bc
Jan.	0.00	0.00	0.00	3.50	0.88bc	3.00	0.00	0.00	0.00	0.75bc
Feb.	0.50	0.00	0.00	4.00	1.13bc	0.50	1.00	1.00	1.50	1.00bc
Mar.	3.50	15.00	6.50	34.00	14.75a	4.00	12.00	2.00	15.00	8.25abc
Mean	0.83b	1.63b	1.17b	8.83a		1.79b	1.46b	1.67b	5.08a	

B= Buildings F= Field crops T= Trees W= water canal

* Means have the same are not significantly differed by using Duncan's analysis.

Seasonal of Population fluctuation of Cattle egret, *B. ibis ibis* (L.):

Data in table (2) showed that the highest value of cattle egret birds at Tahta district were in spring 2014 and 2015 with means (5.71 and 5.21 individuals) and winter 2015 and 2016 (5.58 and 3.21 individuals), with insignificant difference between them. Moderate value was recorded in summer 2014 and 2015 with means (1.10 and 1.34 individuals). While, the lowest value of cattle

egret was recorded in autumn 2014 and 2015 with means (0.13 and 0.13 individuals). Omar (2005) cleared that population means of Cattle egret, *B. ibis ibis* reached its maximum during Autumn 2003 (13.42 bird) and Summer 2004 (19.25 bird), while reached its minimum during Winter 2003 and 2004 (2.08 & 4.03 bird), Spring 2003 & 2004 (5.58 & 3.00 bird), Summer 2003 (6.50 bird) and Autumn 2004 (8.42 bird).

Table 2. Seasonal fluctuation of Cattle egret, *B. ibis ibis* (L.) at Tahta district, Sohag governorate from 2014 to 2016.

	2014/2015					2015/2016				
	Different habitats									
	B	F	T	W	Mean*	B	F	T	W	Mean*
Spring	1.83	1.17	2.33	17.50	5.71a	1.50	1.00	4.67	13.67	5.21a
Summer	0.00	0.00	0.17	4.00	1.10ab	3.17	0.50	1.00	0.67	1.34b
Autumn	0.17	0.33	0.00	0.00	0.13b	0.00	0.00	0.00	0.50	0.13b
Winter	1.33	5.00	2.17	13.83	5.58a	2.50	4.33	1.00	5.50	3.21ab
Mean	1.63b	1.63b	1.17b	8.83a		1.79b	1.46b	1.67b	4.96a	

B= Buildings F= Field crops T= Trees W= water canal

* Means have the same are not significantly differed by using Duncan's analysis.

Biological aspects associated with Cattle egret, *B. ibis ibis* (L.):

The process of reproduction or breeding is an ineluctable prerequisite for the propagation of any bird species. The breeding phase is intimately tied to the distribution and abundance of food resources in their environment. The adequate timing of reproduction and the

breeding success are two fundamental attributes of breeding. One of the dominant bird species Cattle egret, *B. ibis ibis* was chosen to study some biological aspects under field condition of Sohag governorate. It is the non-breeding adult has mainly white plumage, a yellow bill and greyish-yellow legs. The sexes are similar, but the male is marginally larger and has slightly longer breeding plumes than the female; juvenile birds lack cultured plumes and have a black bill.

Cattle egret birds preferred to making of nests in colonies on trees nearby the aquatic environment, because of the abundance of food and the protection of its youngs. Cattle egrets preferred farmlands, as well as inhabited marshes (Nelfa *et al.*, 2015). The biological studies on Cattle egret had been conducted during 2016 breeding season at Sohag governorate.

Breeding season:

In the area under inquisition (Upper Egypt), the breeding period of Cattle egrets was reported to be from January to Aughust, 2016. Barakat -Noura (2016) noted the breeding seasons to start chiefly during January to July in North Egypt. This may be due to variations in temperature and humidity in the South of Egypt compared to the North of Egypt. The first preference of nesting tree was *Acacia niloticus*. Nests designed by natural selection to help parent meet the needs of it youngs. In Egypt, Soliman (1999) revealed that the breeding season of Cattle egret started during the period from March to August at Kafr El-Sheikh Governorate.

Nests and eggs-laid:

In the area under inquisition, the nesting colonies of Cattle egrets were recorded to be exclusively nonspecific with only Cattle egrets nesting on the nesting tree. Egg brood proceeded after the nest was constructed by the paired partners (male and female) during this period, daily observation pertaining to the egg laying pattern of the Cattle egret revealed that the time interval between the two successive brood was approximately 30-36 hours. Range of time of onset of egg laying in the study area is depicted in the Table (3).

Table 3. Time of onset of egg- brood in Cattle egrets at five clutches in the study area during 2016 breeding season.

Clutches	Time of onset of egg-laying
First	First week of January, 2016
Second	Last week of February, 2016
Third	Second week of April, 2016
Fourth	First week of June, 2016
Fifth	Third week of July, 2016

Egg brood duration:

Data in Table (4) show that Cattle egret lays five clutches which extend from 3 to 26 January, 28 February to 21/March, 16/ April to 7/May, 2 to 22/June and 17/July to 5/August, 2016 breeding season, for the five successive clutches, respectively. The mean of number of inspected nests and eggs were (20 nests with 68 eggs) during breeding season 2016.

Table 4. Number of inspected nests, total eggs and mean of Cattle egret, *Bubulcus ibis* the study area during 2016 breeding season.

Clutches	Time of onset of egg-laying.	No. of inspected nests	Total No. of eggs*
First	3-26/Jan./2016	20	68ab
Second	28/Feb.-21/Mar./2016	20	76a
Third	16/Apr.-7/May/2016	20	72a
Fourth	2-22/Jun./2016	20	66ab
Fifth	17/Jul.- 5/Aug./2016	20	58b
Mean		20	68

* Means have the same are not significantly differed by using Duncan's analysis.

Our results agree with that obtained by some authors, Soliman (1999) mentioned that the Cattle egrets lays four clutches extended from 25 March to 9 April, from 7 to 17 May, from 20 June to 1 July and from 1 to 9 August. El-Danasory (2002) showed that Cattle egret lays four

successive clutches which extend from 8 to 20 April, from 26 May to 6 June, from 8 to 16 July, and from 14 to 20 Augusts, respectively. Barakat -Noura(2016) revealed that some biological aspects of Cattle egret, *Bubulcus ibis ibis* under field condition of Gharbia governorate. She found that the time interval between the two successive laying was approximately 24-28 hours. Cattle egret layed four successive clutches which extended from (1 to 27 January, 4 to 31 March, 26 April to 12 May, and 7 to 24 June), respectively.

Clutch size:

Clutch size variation can originate from genetic variation (Van Noordwijk *et al.*, 1980) or phenotypic response to environmental conditions (Murphy, 1983). The range of the clutch size was recorded to be 1 to 5 eggs, 3 being the commonest and exception 1 during the study period with 60.00% of nests with three eggs, 15.00% with four, 10.00% with two and five eggs and remaining 5.00% with one egg. Nests and numbers of eggs – laid were monitored during the breeding seasons of Cattle egret, *Bubulcus ibis ibis* during 2016. The results showed that, the lowest mean number of eggs/ nest – laid was observed during fifth clutch with 2.90 eggs, following by first and forth clutches with means of number eggs/ nest-laid were (3.40 and 3.30 eggs). While, the highest mean number of eggs/ nest – laid was recorded during second clutch (3.80 eggs), following by Third clutch (3.60 eggs), respectively. El-Danasory (2002) revealed that, clutch size of Cattle egrets was a variable among four clutches as 3.5, 3.4, 2.9 and 2.75 eggs 1st, 2nd, 3rd and 4th respectively. Barakat -Noura(2016) showed the clutch size was variable among four clutches as 2.6, 2.8, 2.6, and 2.6 eggs, in the first, second, third and fourth clutches, respectively.

Table 5. Number of inspected nests, Av.No. of clutch size egg/nest and mean of Cattle egret, *Bubulcus ibis ibis* in the study area during 2016 season.

Clutches	Time of onset of egg-laying.	No. of inspected nests	Av. No. of clutch size egg / nest*
First	3-26/Jan./2016	20	3.40a
Second	28/Feb.-21/Mar./2016	20	3.80a
Third	16/Apr.-7/May/2016	20	3.60a
Fourth	2-22/Jun./2016	20	3.30a
Fifth	17/Jul.- 5/Aug./2016	20	2.90a
Mean		20	3.40

* Means have the same are not significantly differed by using Duncan's analysis.

Incubation period:

The incubation period started immediately after the laying of eggs in the present study. Daily observation pertaining to the egg incubation process pattern of the female of Cattle egret birds revealed that it is a warm temperature must be maintained to promote embryo development. And the daily observation reported that females were incubators of eggs during this period. Data in Table (6) show The minimum of incubation period of Cattle egret birds was (19 days). Maximum incubation period was (22 days) during breeding season 2016. This reporting was not significantly different from that of Soliman (1999) stated that the incubation period did not considerably differ from one clutch to another as it averaged 22.1, 22.0, 21.9 and 21.7 days for the four clutches respectively. El-Danasory (2002) reported that, incubation period of Cattle egrets differed according to temperature degree it decreased when temperature increased as it averaged 23.73, 23.33, 23.07 and 21.78 days for the four clutches respectively. Kour and Sahi (2013) recorded the average of incubation period ranging from 21-23 days.

Barakat -Noura(2016) recorded that the Means of incubation period of Cattle egret was 23, 22.5, 22.05 and 19.2 day for the fourth clutch, respectively.

Table 6. Number of inspected nests, incubation period/day and mean of Cattle egret, *Bubulcus ibis ibis* in the study area during 2016 season.

Clutches	Time of onset of egg-laying.	No. of inspected nests	Incubation period/day*
First	3-26/Jan./2016	20	22a
Second	28/Feb.-21/Mar./2016	20	21.50a
Third	16/Apr.-7/May/2016	20	21.50a
Fourth	2-22/Jun./2016	20	21a
Fifth	17/Jul.- 5/Aug./2016	20	19a
Mean		20	21

* Means have the same are not significantly differed by using Duncan's analysis.

Hatchability:

After completion the embryo growth in eggs starting of hatching stage. Previous studies indicate that there the relationship between ambient temperature and egg viability could contribute to both seasonal and latitudinal trends in clutch size, hatching success and hatching asynchrony, (Stoleson and Beissinger, 1999).

Data in Table (7) show the percentage of hatching of Cattle egrets during breeding season 2016. The hatchability of Cattle egrets differed according to clutch; its value was 70.58% at the first clutch, 73.68% at the second clutch, 72.22% at the third clutch, 69.69% at the fourth clutch. While the lowest percentage of hatching was recoded in fifth clutch (65.52%), during season 2016, respectively. Barakat -Noura(2016) studied the hatchability of Cattle egrets differ according to clutch, its value was 50% at the first clutch, 64.28% at the second clutch, 69.92% at the third clutch and 76.92% at the fourth clutch.

Table 7. Number of inspected nests, hatching(%) and mean of Cattle egret, *Bubulcus ibis ibis* in the study area during 2016 season.

Clutches	Time of onset of egg-laying.	No. of inspected nests	Hatching (%)*
First	3-26/Jan./2016	20	70.58ab
Second	28/Feb.-21/Mar./2016	20	73.68a
Third	16/Apr.-7/May/2016	20	72.22a
Fourth	2-22/Jun./2016	20	69.69ab
Fifth	17/Jul.- 5/Aug./2016	20	65.52b
Mean		20	70.58%

* Means have the same are not significantly differed by using Duncan's analysis.

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دراسة التذبذب الشهري والموسمي وموسم التربية لطائر أبو قردان (*Bubulcus ibis ibis* L.) بمركز طهطا - محافظة سوهاج

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أجريت هذه الدراسة على طائر أبو قردان (*B. ibis ibis* L.) في مركز طهطا بمحافظة سوهاج بهدف التعرف على بعض النواحي البيولوجية وسلوك التربية والتكاثر خلال عام ٢٠١٦ وحققنا الدراسة النتائج الآتية: أظهرت الدراسة أن هناك تأثيراً واضحاً لنوع البيئة الزراعية على تعداد طائر أبو قردان، حيث سجلت البيئة الزراعية القريبة من المجارى المائية أعلى تعداد للطائر خلال عامي الدراسة، مما يدل على أن البيئة المائية مفضلة للطائر نظراً لتوفر الغذاء والمأوى والتعشيش للطائر مقارنة بالبيئات الأخرى بالنسبة لدراسة المجموع خلال شهور السنة، سجل أعلى تعداد في شهر مارس ٢٠١٥ و ٢٠١٦ بمتوسط عام (١٤.٧٥ و ٨.٢٥ فرداً) يليه أبريل ٢٠١٤ و ٢٠١٥، ومايو ٢٠١٤. بينما أقل تعداد سجل في الشهور (يونيه ٢٠١٤، يوليو ٢٠١٤، وأغسطس ٢٠١٤ و ٢٠١٥، سبتمبر ٢٠١٤ و ٢٠١٥، ديسمبر ٢٠١٤ و ٢٠١٥، يناير ٢٠١٥ و ٢٠١٦، وفبراير ٢٠١٥ و ٢٠١٦). أظهرت الدراسة أن أعلى تعداد لطائر أبو قردان سجل في موسمي الربيع والشتاء، بينما أقل تعداد سجل في موسم الخريف خلال عامي الدراسة. بناء العش: يبدأ الطائر في بناء العش ابتداء من شهر ديسمبر حيث كان بناء العشوش على هيئة مستعمرات بأشجار السطوط القائم على ضفاف الترع المائية في المنطقة محل الدراسة مرحلة وضع البيض: تم وضع أول بيضة في شهر يناير واستمرت هذه العملية طول فترة التربية والتي انتهت بوضع آخر بيضة في شهر أغسطس. حجم الحضنة: يختلف حجم الحضنة (عدد البيض/ العش) من عش لآخر خلال موسم التربية حيث تضع الأنثى البيض بأعداد متفاوتة من ١ - ٥ بيضة في الحضنة الواحدة، وفي العادة تضع الأنثى حوالي ٣ بيضات في الحضنة الواحدة. فترة الحضنة: بلغت فترة الحضنة في بداية موسم التربية حوالي (٢٢ يوم) خلال شهر يناير، بينما انخفضت هذه الفترة في نهاية الموسم وبلغت (١٩ يوم) خلال شهر (يوليو وأغسطس). نسبة الفقس: أوضحت الدراسة أن أعلى نسبة الفقس بلغت (٧٣.٦٨%) خلال الحضنة الثانية (٢٨ فبراير – ٢١ مارس)، وأقلها كانت خلال الحضنة الخامسة والأخيرة للطائر (١٧ يوليو – ٥ أغسطس) وبلغت (٦٥.٦٢%) خلال موسم التربية ٢٠١٦م.